Appendix C
Initial CHART Assessment for the Upper Willamette River Chinook Salmon ESU

CHART Participants

The CHART for this ESU consisted of the following NOAA Fisheries biologists: Ben Meyer (CHART Leader), Michelle Day, Dan Guy, Lynne Krasnow, Lance Kruzic, Nancy Munn, Mindy Simmons, Cathy Tortorici, and Rich Turner. This CHART assessment also benefitted from review and comments by the Oregon Department of Fish and Wildlife.

ESU Description

The Upper Willamette River chinook ESU was listed as a threatened species in 1999 (64 FR 14208; March 24, 1999). The ESU includes all naturally spawned populations of spring-run chinook salmon in the Clackamas River and in the Willamette River, and its tributaries, above Willamette Falls, Oregon. The following description is based largely on excerpts from the Willamette/Lower Columbia River Technical Recovery Team's (TRT) recent review of historical population structure for this ESU (Myers et al. 2003).

Historically, the Willamette River basin provided sufficient spawning and rearing habitat for large numbers of spring-run chinook salmon. The predominant tributaries to the Willamette River that historically supported spring-run chinook salmon all drain the Cascade Range. The TRT has identified each of these drainages as a historically demographically independent population: Clackamas, Molalla, North Santiam, South Santiam, Calapooia, McKenzie, and Middle Fork Willamette rivers. The TRT also noted that reports of "chinook salmon in westside tributaries have continued to the present; however it is unlikely the abundance of spawners in any of these tributaries constitutes a [demographically independent population]."

Spring-run chinook salmon populations in the upper Willamette River basin and Clackamas River have been strongly influenced by extensive hatchery transfers of fish throughout the ESU for nearly 100 years as well as the introduction of fall-run chinook salmon. Prior to the laddering of Willamette Falls, passage by returning adult salmonids (just upstream of the confluence of the Clackamas and Willamette rivers) was only possible during winter and spring high-flow periods. Low flows during the summer and autumn months prevented fall-run salmon from accessing the upper Willamette River basin. This isolation has provided the potential for significant local adaptation relative to other Columbia River populations. Also, spring-run fish returning to the upper Willamette River basin historically may have strayed into the Clackamas River when conditions at Willamette Falls prevented upstream passage. Therefore, similarities

between Clackamas River and upper Willamette River spring-run fish may reflect an historical/evolutionary association between the two groups.

The early run-timing of adult Willamette River spring-run chinook salmon relative to other lower Columbia River spring-run populations is viewed as an adaptation to flow conditions at Willamette Falls. Chinook salmon begin appearing in the Lower Willamette River in February, but the majority of the run ascends Willamette Falls in April and May, with a peak in mid May. Currently, the migration of adult spring-run chinook salmon over Willamette Falls extends into July and August. Historically, passage over the falls may have been marginal in June, due to diminishing flows, and only larger fish would have been able to ascend.

Adults spawn in both mainstem and tributary habitats of eastside drainages to the Willamette River typically from late July to October. The juvenile life-history characteristics of upper Willamette River spring-run salmon appear to be highly variable. Fry emerge from February to March, although sometimes as late as June. Juveniles appear to emigrate continuously out of the tributaries and into the mainstem Willamette River as fry (late winter to early spring), fingerlings (fall to early winter) and yearlings (late winter to spring). Most juveniles enter the ocean as yearlings after overwintering and rearing in the mainstem Willamette and Columbia rivers. In general, the majority of spring chinook salmon returning to the upper Willamette River basin currently mature at 4 and 5 years old.

CHART Area Assessments and Initial Conservation Value Ratings

The Willamette/Lower Columbia Technical Recovery Team (TRT) has identified groups of populations in this recovery planning domain into "strata" intended to assist in evaluating ESU-wide recovery scenarios (McElhany et al. 2002). The strata are based on major life history characteristics (e.g., species run types) and ecological zones. The upper Willamette River chinook salmon ESU consists of a single stratum due to it being a single run type (spring-run fish) that spawns within a single ecological zone (Willamette River). Recovery planning will likely emphasize the need for a geographical distribution of viable populations across the range of such strata/regions in an ESU (Ruckelshaus et al. 2002, McElhany et al. 2003). Therefore, as part of its assessment the CHART considered the conservation value of each HUC5 in the context of the populations within this stratum.

The CHART assessment for this ESU addressed 10 subbasins containing 56 occupied watersheds, as well as the lower Willamette/Columbia River rearing/migration corridor. Subbasins were chosen as freshwater critical habitat units because they present a

convenient and systematic way to organize the CHART's watershed assessments for this ESU.

Unit 1. Middle Fork Willamette Subbasin (HUC4# 17090001)

The Middle Fork Willamette subbasin is the southernmost drainage in the Willamette River Valley and contained in Douglas and Lane counties, Oregon. The subbasin contains 10 watersheds occupied by this ESU and these watersheds encompass approximately 1,367 mi^2 and 1,382 miles of streams. Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) identify approximately 273 miles of occupied riverine habitat in the watersheds (ODFW 2003a,b). Myers et al. (2003) identified one demographically independent population (Middle Fork Willamette River) in this subbasin. These authors also noted that Nicholas (1995) concluded that the native spring-run population was extinct, although some spawning by hatchery-origin fish may occur. The CHART concluded that, despite uncertainties about the origin of the fish occupying these watersheds today, all of the occupied areas likely contain one or more PCEs for this ESU. Table C1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map C1 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the occupied HUC5 watersheds in this subbasin were of either high or medium conservation value to the ESU. Of the 10 HUC5s reviewed, four were rated as having high and six were rated as having medium conservation value. The CHART also concluded that the HUC5s with medium overall ratings contained a high value rearing and migration corridor connecting high value upstream watersheds with downstream reaches and the ocean. Table C2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure C1 shows the overall distribution of ratings by HUC5 watershed. Among the key considerations identified in Table C2, the CHART noted that the TRT has classified the Middle Fork Willamette River chinook salmon as a core population (historically abundant and "may offer the most likely path to recovery") (McElhany et al. 2003).

Unit 2. Coast Fork Willamette Subbasin (HUC4# 17090002)

The Coast Fork Willamette subbasin is in the upper Willamette River drainage and contained Douglas and Lane counties, Oregon. The subbasin contains four watersheds occupied by this ESU and these watersheds encompass approximately 664 mi^2 and 699

miles of streams. Fish distribution and habitat use data from ODFW identify approximately 44 miles of occupied riverine habitat in the watersheds (ODFW 2003a,b). Myers et al. (2003) did not identify a demographically independent population in this subbasin, and Kostow (1995) characterized them as extinct. Myers et al. (2003) noted that reports of "chinook salmon in westside tributaries have continued to the present; however it is unlikely the abundance of spawners in any of these tributaries constitutes a [demographically independent population]. Table C1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration reaches, as well as management activities that may affect these reaches in the watersheds. Map C2 depicts the specific areas in this subbasin occupied by the ESU, but is unclear whether all of these areas qualify for consideration as critical habitat for this ESU.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the four occupied HUC5 watersheds in this subbasin were of low conservation value to the ESU. Table C2 summarizes the CHART scores and initial conservation value ratings, and Figure A1 shows the overall distribution of ratings by HUC5 watershed. Among the key considerations identified in Table C2, the CHART noted that the TRT had not identified a demographically independent population in these watersheds (Myers et al. 2003) as well as the very limited habitat in the subbasin.

Unit 3. Upper Willamette Subbasin (HUC4# 17090003)

The Upper Willamette subbasin contains both eastside and westside drainages as well as the mainstem Willamette River upstream of its confluence with the Santiam River. The subbasin is contained in the following Oregon counties: Benton, Lane, Lincoln, Linn, and Polk. The subbasin contains six watersheds occupied by this ESU and these watersheds encompass approximately 1,872 mi^2 and 2,140 miles of streams. Fish distribution and habitat use data from ODFW identify approximately 225 miles of occupied riverine habitat in the watersheds (ODFW 2003a,b). Myers et al. (2003) identified possibly four demographically independent populations in this subbasin but only one with spawning habitat (Calapooia River). Myers et al. (2003) also noted that reports of "chinook salmon in westside tributaries have continued to the present; however it is unlikely the abundance of spawners in any of these tributaries constitutes a [demographically independent population]." The CHART concluded that, despite uncertainties about the origin of the fish occupying some of these watersheds today and in light of recent comments from ODFW about the importance of rearing habitats in these areas, the occupied areas likely contain one or more PCEs for this ESU. Table C1 summarizes the total number of

occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map C3 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the occupied HUC5 watersheds in this subbasin were of either medium or low conservation value to the ESU. Of the six HUC5s reviewed, three were rated as having low and three were rated as having medium conservation value. These ratings reflect increases (from Low to Medium) in *preliminary* conservation value ratings for the Mary's and Luckiamute River watersheds as a result of comments provided by ODFW about the importance of some westside tributaries for rearing chinook salmon. The CHART also concluded that all reaches of the Willamette River within this subbasin (including watersheds with a low overall rating) constitute a high value rearing and migration corridor connecting upstream populations (e.g., those in the McKenzie, Middle Fork Willamette, and Calapooia Rivers) and high value HUC5s with downstream reaches and the ocean. Table C2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure C1 shows the overall distribution of ratings by HUC5 watershed. Among the key considerations identified in Table C2, the CHART noted that the Calapooia River HUC5 was the only one identified as having spawning habitat for this subbasin as well as the demographically independent population identified therein.

Unit 4. McKenzie River Subbasin (HUC4# 17090004)

The McKenzie River subbasin is a Cascade Range drainage of the Upper Willamette River and contained in Lane and Linn counties, Oregon. The subbasin contains seven watersheds occupied by this ESU and these watersheds encompass approximately 1,339 mi^2 and 1,251 miles of streams. Fish distribution and habitat use data from ODFW identify approximately 268 miles of occupied riverine habitat in the watersheds (ODFW 2003a,b). Myers et al. (2003) identified one demographically independent population (McKenzie River) in this subbasin. This is probably the only self-sustaining population above Willamette Falls, and possibly in the entire ESU (Myers et al. 2003, NOAA Fisheries 2003). The CHART concluded that all of the occupied areas likely contain one or more PCEs for this ESU. Table C1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map C4 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the occupied HUC5 watersheds in this subbasin were of either high or medium conservation value to the ESU. Of the seven HUC5s reviewed, five were rated as having high and two were rated as having medium conservation value. Table C2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure C1 shows the overall distribution of ratings by HUC5 watershed. Among the key considerations identified in Table C2, the CHART noted that the TRT has classified the McKenzie River chinook salmon as both a core population (historically abundant and "may offer the most likely path to recovery") as well as a genetic legacy population (one of the "the most intact representatives of the genetic character of the ESU") (McElhany et al. 2003). Likewise, ODFW considered the McKenzie River as essential habitat for spring chinook salmon (ODFW 1993 as cited in Bastasch et al. 2003). Also, occupied reaches in several HUC5s overlap with FEMAT key watersheds for at-risk anadromous salmonids (FEMAT 1994).

Unit 5. North Santiam River Subbasin (HUC4# 17090005)

The North Santiam River subbasin is a Cascade Range drainage of the Upper Willamette River and contained in Clackamas, Linn, and Marion counties, Oregon. The subbasin contains six watersheds, three of which are occupied by this ESU and encompass approximately 315 mi^2 and 340 miles of streams. Fish distribution and habitat use data from ODFW identify approximately 125 miles of occupied riverine habitat in these watersheds (ODFW 2003A,B). Myers et al. (2003) identified one demographically independent population (North Santiam River) in this subbasin. Historically accessible areas in the three uppermost watersheds of this subbasin are now blocked by Big Cliff and Detroit dams. These dams block access to approximately 70% of the historic spawning area in this subbasin (Myers et al. 2003). The CHART concluded that all of the occupied areas likely contain one or more PCEs for this ESU. Table C1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map C5 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the occupied HUC5 watersheds in this subbasin were of either high or medium conservation value to the ESU. Of the three HUC5s reviewed, two were rated as having high and one was rated as having medium conservation value. Table C2 summarizes the CHART's PCE/watershed

scores and initial conservation value ratings, and Figure C1 shows the overall distribution of ratings by HUC5 watershed. Among the key considerations identified in Table C2, the CHART noted that the TRT has classified the North Santiam River chinook salmon as a core population (historically abundant and "may offer the most likely path to recovery") (McElhany et al. 2003). Likewise, ODFW considered the North Santiam River and Little North Santiam River as essential habitat for spring chinook salmon (ODFW 1993 as cited in Bastasch et al. 2003). Also, occupied reaches in Little North Santiam HUC5 overlap with a FEMAT key watershed for at-risk anadromous salmonids (FEMAT 1994).

The CHART also concluded that the three inaccessible HUC5s (Upper North Santiam, North Fork Breitenbush River, and Detroit Reservoir/Blowout Divide Creek) may be essential to the conservation of the ESU. All three HUC5s are presently occupied by non-listed hatchery chinook salmon which are trapped downstream and released into these HUC5s. The team determined that the Detroit Reservoir/Blowout Divide Creek HUC5 would have a lower overall conservation value due to the large areas inundated by Detroit Reservoir. The CHART concluded that these unoccupied areas may be essential because: (1) they once supported a TRT core population; (2) they contain non-inundated habitats that are still relatively abundant and in fair to good condition and improving; (3) there is evidence that the areas can support significant natural production; and (3) the naturally-reproducing population below Big Cliff Dam has limited spawning PCEs and appears to suffer from high mortality rates (Willamette National Forest [WNF] 1994, WNF 1995, WNF 1996, WNF 1997, Ziller et al. 2002, McElhany et al. 2003). The CHART noted that NOAA Fisheries' status review of this ESU stated "the declines in spring chinook salmon in the Upper Willamette River ESU can be attributed in large part to the extensive habitat blockages caused by dam construction." In addition, the CHART also noted that providing passage at dams and diversions has been identified as a key potential conservation measure for Willamette River salmon and steelhead (Martin et al. 1998, Bastasch et al. 2002). Therefore, the CHART concluded that the ESU would likely benefit if the extant population had access to spawning/rearing habitat upstream and that these areas may warrant consideration as critical habitat.

Unit 6. South Santiam River Subbasin (HUC4# 17090006)

The South Santiam River subbasin is a Cascade Range drainage of the Upper Willamette River and contained in Linn County, Oregon. The subbasin contains eight watersheds, six of which are occupied by this ESU and encompass approximately 766 mi^2 and 860 miles of streams. Fish distribution and habitat use data from ODFW identify approximately 169 miles of occupied riverine habitat in these watersheds (ODFW 2003A,B). Two watersheds in the upper Middle Santiam River (Quartzville Creek and

Middle Santiam River) are blocked by Green Peter Dam. Myers et al. (2003) identified one historically independent population (South Santiam River) in this subbasin. The CHART concluded that all of the occupied areas likely contain one or more PCEs for this ESU. Table C1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map C6 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the occupied HUC5 watersheds in this subbasin were of either high or medium conservation value to the ESU. Of the six HUC5s reviewed, three were rated as having high and three were rated as having medium conservation value. Table C2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure C1 shows the overall distribution of ratings by HUC5 watershed. Among the key considerations identified in Table C2, the CHART noted the relatively large amount of potential current habitat (NOAA Fisheries 2003) and the relatively high density of redds observed in recent spawner surveys as compared to other subbasins. (Schroeder et al. 2002 and 2003). While the majority of these spawners were likely of hatchery origin, the CHART believed that these data may be indicative of the availability of abundant spawning PCEs and high production potential in portions of this subbasin.

Unit 7. Middle Willamette River Subbasin (HUC4# 17090007)

The Middle Willamette River subbasin encompasses most of the valley floor reaches of the Willamette River upstream of Willamette Falls and is contained in the following Oregon counties: Clackamas, Marion, Polk, Yamhill, and Washington. The subbasin consists of four watersheds, all of which are occupied by this ESU and encompass approximately 712 mi^2 and 922 miles of streams. Fish distribution and habitat use data from ODFW identify approximately 158 miles of occupied riverine habitat (all rearing/migration) in these watersheds (ODFW 2003A,B). Myers et al. (2003) identified only a small portion of the spawning range of one demographically independent population (North Santiam River) in this subbasin, although six populations use this subbasin for rearing/migration. The CHART concluded that all of the occupied areas likely contain one or more PCEs for this ESU. Table C1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the

watersheds. Map C7 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the occupied HUC5 watersheds in this subbasin were of low conservation value to the ESU. However, that assessment pertained solely to the tributary streams in these watersheds (e.g., Ash, Rickreall, and Harvey creeks), not the mainstem Willamette River. The CHART concluded that all reaches of the Willamette River within this subbasin constitute a high value rearing and migration corridor. These high value reaches connect nearly all populations and HUC5s in this ESU (except those in the Clackamas River; Myers et al. 2003) with downstream reaches and the ocean. Table C2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure C1 shows the overall distribution of ratings by HUC5 watershed.

Unit 8. Yamhill River Subbasin (HUC4# 17090008)

The Yamhill River subbasin is a Coast Range drainage of the middle Willamette River and is contained primarily in Polk and Yamhill counties, Oregon (with very small and unoccupied portions in Lincoln, Tillamook, and Washington counties as well). The subbasin contains seven watersheds, four of which are occupied by this ESU and encompass approximately 495 mi^2 and 605 miles of streams. Fish distribution and habitat use data from ODFW identify approximately 71 miles of occupied riverine habitat (all rearing/migration) in these watersheds (ODFW 2003A,B). Myers et al. (2003) did not identify a demographically independent population in this subbasin. Myers et al. (2003) noted that reports of "chinook salmon in westside tributaries have continued to the present; however it is unlikely the abundance of spawners in any of these tributaries constitutes a [demographically independent population]." The CHART concluded that, despite uncertainties about the origin of the fish occupying some of these watersheds today and in light of recent comments from ODFW about the importance of rearing habitats in these areas, the occupied areas likely contain one or more PCEs for this ESU. Table C1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration reaches, as well as management activities that may affect these reaches in the watersheds. Map C8 depicts the specific areas in this subbasin occupied by the ESU, but is unclear whether all of these areas qualify for consideration as critical habitat for this ESU.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the four occupied HUC5 watersheds in this subbasin were of low conservation value to the ESU. Table C2

summarizes the CHART scores and initial conservation value ratings, and Figure A1 shows the overall distribution of ratings by HUC5 watershed. Among the key considerations identified in Table C2, the CHART noted that there were no spawning PCEs in these west-side tributaries and the fact that these watersheds were not identified as part of a historical, demographically independent population (Myers et al. 2003). However, The CHART noted that the lowermost reaches of the Yamhill River watershed (those near the confluence with the Willamette River) may provide important juvenile rearing habitat for eastside Willamette River populations upstream.

Unit 9. Molalla/Pudding River Subbasin (HUC4# 17090009)

The Molalla/Pudding River subbasin is an eastside drainage of the middle Willamette River and contained in Clackamas and Marion counties, Oregon. The subbasin contains six watersheds occupied by this ESU and encompasses approximately 875 mi^2 and 1,057 miles of streams. Fish distribution and habitat use data from ODFW identify approximately 181 miles of occupied riverine habitat in these watersheds (ODFW 2003A,B). The CHART concluded that all of the occupied areas likely contain one or more PCEs for this ESU. Table C1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map C9 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the occupied HUC5 watersheds in this subbasin were of either medium or low conservation value to the ESU. Of the six HUC5s reviewed, two were rated as having medium (Upper and Lower Molalla River HUC5s) and four were rated as having low conservation value. Table C2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure C1 shows the overall distribution of ratings by HUC5 watershed. Among the key considerations identified in Table C2, the CHART noted that this particular subbasin has relatively low abundance and distribution objectives identified by ODFW for spring chinook (ODFW 2001 as cited in Bastasch et al. 2002).

Unit 10. Clackamas River Subbasin (HUC4# 17090011)

The Clackamas River subbasin is a Cascade Range drainage of the lower Willamette River and the only subbasin with spawning habitat for this ESU below Willamette Falls. The subbasin contains six watersheds, all of which are occupied by this ESU and encompass approximately 942 mi^2 and 1,109 miles of streams. Fish distribution and

habitat use data from ODFW identify approximately 137 miles of occupied riverine habitat in these watersheds (ODFW 2003A,B). Myers et al. (2003) identified one demographically independent population (Clackamas River) in this subbasin. The CHART concluded that all of the occupied areas likely contain one or more PCEs for this ESU. Table C1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map C10 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the occupied HUC5 watersheds in this subbasin were of either high or low conservation value to the ESU. Of the six HUC5s reviewed, all but one (Eagle Creek HUC5) were rated as having high conservation value. Table C2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure C1 shows the overall distribution of ratings by HUC5 watershed. Among the key considerations identified in Table C2, the CHART noted that the TRT has classified the Clackamas River chinook salmon as a core population (historically abundant and "may offer the most likely path to recovery") (McElhany et al. 2003). Likewise, ODFW considered the Clackamas River (above North Fork Dam) as essential habitat for spring chinook salmon (ODFW 1993 as cited in Bastasch et al. 2003). Also, occupied reaches in the uppermost HUC5s overlap with FEMAT key watersheds for at-risk anadromous salmonids (FEMAT 1994).

Unit 11. Lower Willamette/Columbia River Corridor

For the purposes of describing units of critical habitat designation for this ESU, NOAA Fisheries defines the lower Willamette/Columbia River corridor as that segment from the confluence of the Willamette and Clackamas rivers to the Pacific Ocean. This corridor also includes the Multnomah Channel portion of the Lower Willamette River. Watersheds downstream of the Clackamas River subbasin (Johnson Creek and Columbia Slough/Willamette River HUC5s) are outside the spawning range of this ESU and likely used in a limited way as juvenile rearing habitat for this ESU. Fish distribution and habitat use data from ODFW identify approximately 137 miles of occupied riverine and estuarine habitat in this corridor (ODFW 2003A,B).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the lower Willamette/Columbia River corridor was of high conservation value to the ESU. The CHART noted that this corridor connects every watershed and population in this ESU

with the ocean and is used by rearing/migrating juveniles and migrating adults. The Columbia River estuary is a particularly important area for this ESU as both juveniles and adults make the critical physiological transition between life in freshwater and marine habitats (Marriott et al. 2002).

Marine Areas

NOAA Fisheries' analysis focused on freshwater and estuarine habitats upstream of the mouth of the Columbia River. While marine areas are occupied by this ESU, within this vast area the agency has not identified "specific areas within the geographical area occupied by the species . . . on which are found those physical or biological features . . . essential to the conservation of the species."

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Table C1. Summary of Occupied Areas, PCEs, and Management Activities Affecting PCEs for the Upper Willamette River Chinook Salmon ESU

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Spawning / Rearing PCEs (mi)	Rearing/ Migration PCEs (mi)	Presence/ Migration Only PCEs (mi)*	Management Activities**
C1	Middle Fork Willamette	Upper Middle Fork Willamette River	1709000101	16.3	5.4	0.3	F
C1	Middle Fork Willamette	Hills Creek	1709000102	2.5	2.3	0.0	D, F, R, U
C1	Middle Fork Willamette	Salt Creek/Willamette River	1709000103	19.0	1.6	0.0	F, R
C1	Middle Fork Willamette	Salmon Creek	1709000104	3.0	0.0	0.0	C, F
C1	Middle Fork Willamette	Hills Creek Reservoir	1709000105	19.1	24.5	0.0	D, F
C1	Middle Fork Willamette	North Fork Of Middle Fork Willamette River	1709000106	37.0	1.4	0.0	F, R
C1	Middle Fork Willamette	Middle Fork Willamette/Lookout Point	1709000107	20.0	34.2	0.0	D, F, R
C1	Middle Fork Willamette	Little Fall Creek	1709000108	15.5	3.5	0.0	A, F
C1	Middle Fork Willamette	Fall Creek	1709000109	24.2	14.1	5.1	A, D, R
C1	Middle Fork Willamette	Lower Middle Fork Of Willamette River	1709000110	12.5	11.9	0.0	A, D, F, R, U
C2	Coast Fork Willamette	Row River	1709000201	0.0	7.4	0.0	D, R, U
C2	Coast Fork Willamette	Mosby Creek	1709000202	11.6[?]	3.0	0.0	A, F, R
C2	Coast Fork Willamette	Upper Coast Fork Willamette River	1709000203	0.0	2.3	0.0	D, C, M, R, U
C2	Coast Fork Willamette	Lower Coast Fork Willamette River	1709000205	0.0	19.8	0.0	A, C, D, R, U
C3	Upper Willamette	Long Tom River	1709000301	0.0	6.9	0.0	A, R
C3	Upper Willamette	Muddy Creek	1709000302	0.0	80.1	0.0	A, C, R, U, W
C3	Upper Willamette	Calapooia River	1709000303	36.4	24.9	0.0	A, F, R, U

C3	Upper Willamette	Oak Creek	1709000304	0.0	34.3	0.0	A, R, U
C3	Upper Willamette	Marys River	1709000305	0.0	29.2	0.0	A, R, U
C3	Upper Willamette	Luckiamute River	1709000306	0.0	13.4	0.0	A
C4	Mckenzie	Upper Mckenzie River	1709000401	21.4	5.0	0.0	A, D, F
C4	Mckenzie	Horse Creek	1709000402	18.7	1.5	0.0	A, F
C4	Mckenzie	South Fork Mckenzie River	1709000403	22.5	18.8	0.8	D, F
C4	Mckenzie	Blue River	1709000404	1.4	0.1	0.0	D, F
C4	Mckenzie	Mckenzie River/Quartz Creek	1709000405	17.1	9.6	0.0	D, F, R
C4	Mckenzie	Mohawk River	1709000406	7.4	45.3	4.4	A, F
C4	Mckenzie	Lower Mckenzie River	1709000407	58.9	33.5	2.0	A, C, D, F, R, U
C5	North Santiam	Middle North Santiam River	1709000504	23.5	0.6	0.0	A, D, F, R
C5	North Santiam	Little North Santiam River	1709000505	19.5	1.3	0.0	A, F, M
C5	North Santiam	Lower North Santiam River	1709000506	37.1	43.5	0.0	A, D, F, I, S, U
C6	South Santiam	Hamilton Creek/South Santiam River	1709000601	16.5	39.3	0.0	A, C, D, F, I, R, U
C6	South Santiam	Crabtree Creek	1709000602	15.6	20.6	0.0	A, C, F, R
C6	South Santiam	Thomas Creek	1709000603	13.3	24.7	0.0	A, D, F, R
C6	South Santiam	South Santiam River	1709000606	11.4	0.1	0.0	D, F
C6	South Santiam	South Santiam River / Foster Reservoir	1709000607	14.0	4.6	0.0	D, F
C6	South Santiam	Wiley Creek	1709000608	8.5	0.0	0.0	F
C7	Middle Willamette	Mill Creek/Willamette River	1709000701	0.0	27.4	0.0	A, C, I, R, U
C7	Middle Willamette	Rickreall Creek	1709000702	0.0	38.4	0.0	A, R, U
C7	Middle Willamette	Willamette River/Chehalem Creek	1709000703	0.0	70.4	0.0	A, C, R, U, W
C7	Middle Willamette	Abernethy Creek	1709000704	0.0	22.0	0.0	A, C, R, U, W
C8	Yamhill	Lower South Yamhill River	1709000804	0.0	10.9	0.0	A, C, R, U

C8	Yamhill	Salt Creek/South Yamhill River	1709000805	0.0	7.9	0.0	A
C8	Yamhill	North Yamhill River	1709000806	0.0	10.7	0.0	A, U
C8	Yamhill	Yamhill River	1709000807	0.0	41.3	0.0	A, R, U
C9	Molalla/ Pudding	Abiqua Creek/Pudding River	1709000901	15.7	21.3	0.0	A, F, R
C9	Molalla/ Pudding	Butte Creek/Pudding River	1709000902	7.0	36.0	0.0	A, F, R
C9	Molalla/ Pudding	Rock Creek/Pudding River	1709000903	0.0	8.5	0.0	A, I, R
C9	Molalla/ Pudding	Senecal Creek/Mill Creek	1709000904	0.0	17.0	0.0	A, U
C9	Molalla/ Pudding	Upper Molalla River	1709000905	38.0	0.0	0.0	A, F, R
C9	Molalla/ Pudding	Lower Molalla River	1709000906	4.0	33.1	0.0	A, C, F, R, U
C10	Clackamas	Collawash River	1709001101	16.9	0.2	0.0	F
C10	Clackamas	Upper Clackamas River	1709001102	23.7	1.8	0.0	F
C10	Clackamas	Oak Grove Fork Clackamas River	1709001103	4.0	0.0	0.0	D, F
C10	Clackamas	Middle Clackamas River	1709001104	33.9	3.3	0.0	D, F
C10	Clackamas	Eagle Creek	1709001105	13.8	3.2	0.0	A, F, U
C10	Clackamas	Lower Clackamas River	1709001106	22.9	13.4	0.0	A, C, D, F, R, S, U
	Multiple	Lower Willamette/Columbia Rivers	NA	0.0	125	0.0	C, D, I, R, T, U, W

* Some streams classified as "Presence/Migration Only PCEs" may also include rearing or spawning PCEs, but the GIS data are still undergoing review to confirm species use type.

** This list is not exhaustive. It is intended to highlight key management activities affecting PCEs in each watershed. Activities identified are based on the general categories described by Spence et al. (1996) and summarized previously in the "Special Management Considerations or Protection" section of this report. Coding is as follows: F= forestry, G = grazing, A = agriculture, C = channel modifications/diking, R = road building/maintenance, U = urbanization, S = sand and gravel mining, M = mineral mining, D = dams, I = irrigation impoundments and withdrawals, T = river, estuary, and ocean traffic, W = wetland loss/removal, B = beaver removal, X = exotic/invasive species introductions, H = forage fish/species harvest. Primary sources for this information were the CHART and reports by Bastasch et al. (2003), Hulse et al. (2002), Pearson (2003), ODFW (1990a-f, 1992), and land use/land cover GIS layers from the U.S. Geological Survey.

Table C2. Summary of Initial CHART Scores and Ratings of Conservation Value for Habitat Areas in HUC5 Watersheds Occupied by the Upper Willamette River Chinook Salmon ESU

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C1	Middle Fork Willamette	Upper Middle Fork Willamette River	1709000101	10	Moderate-high HUC5 score; PCEs support a TRT core population and may be some of best remaining in subbasin; CHART concluded that uppermost watersheds likely have highest value in this subbasin	High
C1	Middle Fork Willamette	Hills Creek	1709000102	9	Moderate HUC5 score; PCEs support a TRT core population, but are limited in this HUC5	Medium
C1	Middle Fork Willamette	Salt Creek/Willamette River	1709000103	9	Moderate HUC5 score; PCEs support a TRT core population; CHART concluded that this and other uppermost watersheds likely have highest value in this subbasin	High
C1	Middle Fork Willamette	Salmon Creek	1709000104	8	Moderate HUC5 score; PCEs support a TRT core population, but are very limited in this HUC5	Medium
C1	Middle Fork Willamette	Hills Creek Reservoir	1709000105	9	Moderate HUC5 score; PCEs support a TRT core population but are more limited due to inundated habitats; high value connectivity reaches for upstream HUC5s	Medium
C1	Middle Fork Willamette	North Fork Of Middle Fork Willamette River	1709000106	10	Moderate-high HUC5 score; PCEs support a TRT core population population and may be some of best remaining in subbasin; CHART concluded that this and other uppermost watersheds likely have highest value in this subbasin	High

[7] PCE/watershed scores were derived using the CHART scoring process described in the introduction to this report. The CHART employed an earlier 5-factor version of the scoring matrix for three ESUs (Columbia River chum salmon and Upper Willamette River chinook salmon and steelhead) therefore the maximum possible score for these ESUs was 15 points.

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C1	Middle Fork Willamette	Middle Fork Willamette/Lookout Point	1709000107	9	Moderate HUC5 score; PCEs support a TRT core population population but are more limited due to inundated habitats; high value connectivity reaches for upstream HUC5s	Medium
C1	Middle Fork Willamette	Little Fall Creek	1709000108	8	Moderate HUC5 score; PCEs support a TRT core population, but CHART concluded this relatively small HUC5 probably had more limited production than upstream HUC5s	Medium
C1	Middle Fork Willamette	Fall Creek	1709000109	8	Moderate HUC5 score; PCEs support a TRT core population; CHART concluded that this and other uppermost watersheds likely have highest value in this subbasin	High
C1	Middle Fork Willamette	Lower Middle Fork of Willamette River	1709000110	9	Moderate HUC5 score; PCEs support a TRT core population but are more degraded in this lowermost HUC5; high value connectivity reaches for upstream HUC5s	Medium
C2	Coast Fork Willamette	Row River	1709000201	5	Not identified as supporting a demographically independent population; limited habitat/distribution	Low
C2	Coast Fork Willamette	Mosby Creek	1709000202	6	Not identified as supporting a demographically independent population; limited habitat/distribution	Low
C2	Coast Fork Willamette	Upper Coast Fork Willamette River	1709000203	5	Not identified as supporting a demographically independent population; limited habitat/distribution	Low
C2	Coast Fork Willamette	Lower Coast Fork Willamette River	1709000205	6	Not identified as supporting a demographically independent population; limited habitat/distribution	Low

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C3	Upper Willamette	Long Tom River	1709000301	4	Low HUC5 score; not identified as supporting a demographically independent population; very limited PCEs	Low
C3	Upper Willamette	Muddy Creek	1709000302	8	Moderate HUC5 score; CHART concluded that tributaries are low value relative to other HUC5s, but rearing/migration PCEs in Willamette corridor are highly essential for upstream HUC5s/populations	Low
C3	Upper Willamette	Calapooia River	1709000303	8	Moderate HUC5 score; HUC5 contains all spawning PCEs for a demographically independent population	Medium
C3	Upper Willamette	Oak Creek	1709000304	8	Moderate HUC5 score; CHART concluded that tributaries are low value relative to other HUC5s, but rearing/migration PCEs in Willamette corridor are highly essential for upstream HUC5s/populations	Low
C3	Upper Willamette	Marys River	1709000305	4	Low HUC5 score; not identified as supporting a demographically independent population; limited PCEs, however CHART concluded (based on recent information from ODFW) that this watershed may be important for rearing chinook	Medium
C3	Upper Willamette	Luckiamute River	1709000306	4	Low HUC5 score; not identified as supporting a demographically independent population; limited PCEs, however CHART concluded (based on recent information from ODFW) that this watershed may be important for rearing chinook	Medium

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C4	Mckenzie	Upper Mckenzie River	1709000401	13	High HUC5 score; PCEs support a TRT core and legacy population; ODFW considers McKenzie River as essential habitat for spring chinook; PCEs are in a FEMAT key watershed	High
C4	Mckenzie	Horse Creek	1709000402	12	High HUC5 score; PCEs support a TRT core and legacy population; ODFW considers McKenzie River as essential habitat for spring chinook; PCEs are in a FEMAT key watershed	High
C4	Mckenzie	South Fork Mckenzie River	1709000403	12	High HUC5 score; PCEs support a TRT core and legacy population; ODFW considers McKenzie River as essential habitat for spring chinook; PCEs are in a FEMAT key watershed	High
C4	Mckenzie	Blue River	1709000404	7	Low- moderate HUC5 score; PCEs support a TRT core and legacy population; ODFW considers McKenzie River as essential habitat for spring chinook; however very limited PCEs and dam-related impacts reduce the value of this HUC5	Medium
C4	Mckenzie	Mckenzie River/Quartz Creek	1709000405	14	High HUC5 score; PCEs support a TRT core and legacy population; ODFW considers McKenzie River as essential habitat for spring chinook; high value connectivity reaches for upstream HUC5s	High
C4	Mckenzie	Mohawk River	1709000406	8	Moderate HUC5 score; PCEs support a TRT core and legacy population; ODFW considers McKenzie River as essential habitat for spring chinook; lower quality PCEs in this HUC5 relative to upstream HUC5s	Medium

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C4	Mckenzie	Lower Mckenzie River	1709000407	13	High HUC5 score; PCEs support a TRT core and legacy population; ODFW considers McKenzie River as essential habitat for spring chinook; mixed PCE conditions due to dam impacts; high value connectivity reaches for upstream HUC5s; some PCEs in a FEMAT key watershed	High
C5	North Santiam	Upper North Santiam River	1709000501	*	Unoccupied HUC5, but population expansion into this HUC5 possibly essential for conservation; High HUC5 score	Possibly High
C5	North Santiam	North Fork Breitenbush River	1709000502	*	Unoccupied HUC5, but population expansion into this HUC5 possibly essential for conservation; High HUC5 score	Possibly High
C5	North Santiam	Detroit Reservoir/Blowout Divide Creek	1709000503	*	Unoccupied HUC5, but population expansion into this HUC5 possibly essential for conservation; moderate HUC5 score (lower than others in this portion of the subbasin due to inundated habitat)	Possibly Medium
C5	North Santiam	Middle North Santiam River	1709000504	9	Moderate HUC5 score; PCEs support a TRT core population and ODFW considers North Santiam as essential habitat for spring chinook; CHART emphasized importance of expanding population into habitats upstream of this HUC5	High
C5	North Santiam	Little North Santiam River	1709000505	11	High HUC5 score; PCEs support a TRT core population and ODFW considers North Santiam as essential habitat for spring chinook; PCEs are in a FEMAT key watershed	High

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C5	North Santiam	Lower North Santiam River	1709000506	10	Moderate HUC5 score; PCEs support a TRT core population and ODFW considers North Santiam as essential habitat for spring chinook; spawning PCEs in other upstream HUC5s in this subbasin are likely of higher conservation value; high value connectivity reaches for upstream HUC5s	Medium
C6	South Santiam	Hamilton Creek/South Santiam River	1709000601	9	Moderate HUC5 score; PCEs support a TRT demographically independent population; recent high density of redds may be indicative of high production potential; high value connectivity reaches for all HUC5s in this subbasin	High
C6	South Santiam	Crabtree Creek	1709000602	7	Low-moderate HUC5 score; PCEs support a TRT demographically independent population; PCEs are likely of lower quality than other HUC5s in subbasin	Medium
C6	South Santiam	Thomas Creek	1709000603	7	Low-moderate HUC5 score; PCEs support a TRT demographically independent population; PCEs are likely of lower quality than other HUC5s in subbasin	Medium
C6	South Santiam	South Santiam River	1709000606	10	Moderate HUC5 score; PCEs support a TRT demographically independent population; PCEs are likely some of the best for this population despite inundated habitat	High

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C6	South Santiam	South Santiam River / Foster Reservoir	1709000607	10	Moderate HUC5 score; PCEs support a TRT demographically independent population; PCEs likely some of the best for this population despite inundated habitat; high value connectivity reaches for upstream HUC5	High
C6	South Santiam	Wiley Creek	1709000608	7	Low-moderate HUC5 score; PCEs support a TRT demographically independent population; recent high density of redds may be indicative of high production potential but PCEs in this HUC5 are more limited and likely of lower quality than other HUC5s in subbasin	Medium
C7	Middle Willamette	Mill Creek/Willamette River	1709000701	5	Low HUC5 score; PCEs support one TRT population; rearing/migration PCEs in tributaries probably not as important as those for high value connectivity reaches for upstream HUC5s (North Santiam subbasin)	Low
C7	Middle Willamette	Rickreall Creek	1709000702	8	Moderate HUC5 score; PCEs in Willamette corridor are highly essential and support several TRT populations but no spawning PCEs in this HUC5 and CHART concluded that rearing/migration PCEs in westside tributaries are low value	Low
C7	Middle Willamette	Willamette River/Chehalem Creek	1709000703	8	Moderate HUC5 score; no spawning PCEs in HUC5 and CHART concluded that tributaries are low value, but the Willamette corridor is highly essential	Low

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C7	Middle Willamette	Abernethy Creek	1709000704	7	Low-moderate HUC5 score; no spawning PCEs in HUC5 and CHART concluded that tributaries are low value, but the Willamette corridor is highly essential	Low
C8	Yamhill	Lower South Yamhill River	1709000804	5	Not identified as supporting a demographically independent population; no spawning in westside HUC5s and very limited rearing PCEs	Low
C8	Yamhill	Salt Creek/South Yamhill River	1709000805	5	Not identified as supporting a demographically independent population; no spawning in westside HUC5s and very limited rearing PCEs	Low
C8	Yamhill	North Yamhill River	1709000806	5	Not identified as supporting a demographically independent population; no spawning in westside HUC5s and very limited rearing PCEs	Low
C8	Yamhill	Yamhill River	1709000807	7	Not identified as supporting a demographically independent population; no spawning in westside HUC5s; reaches near confluence with Willamette may be provide important rearing for eastside populations upstream	Low
C9	Molalla/Pudding	Abiqua Creek/Pudding River	1709000901	7	Low-moderate HUC5 score; PCEs support a TRT demographically independent population but subbasin has relatively low abundance and distribution objectives identified by ODFW; PCE quality relatively low	Low

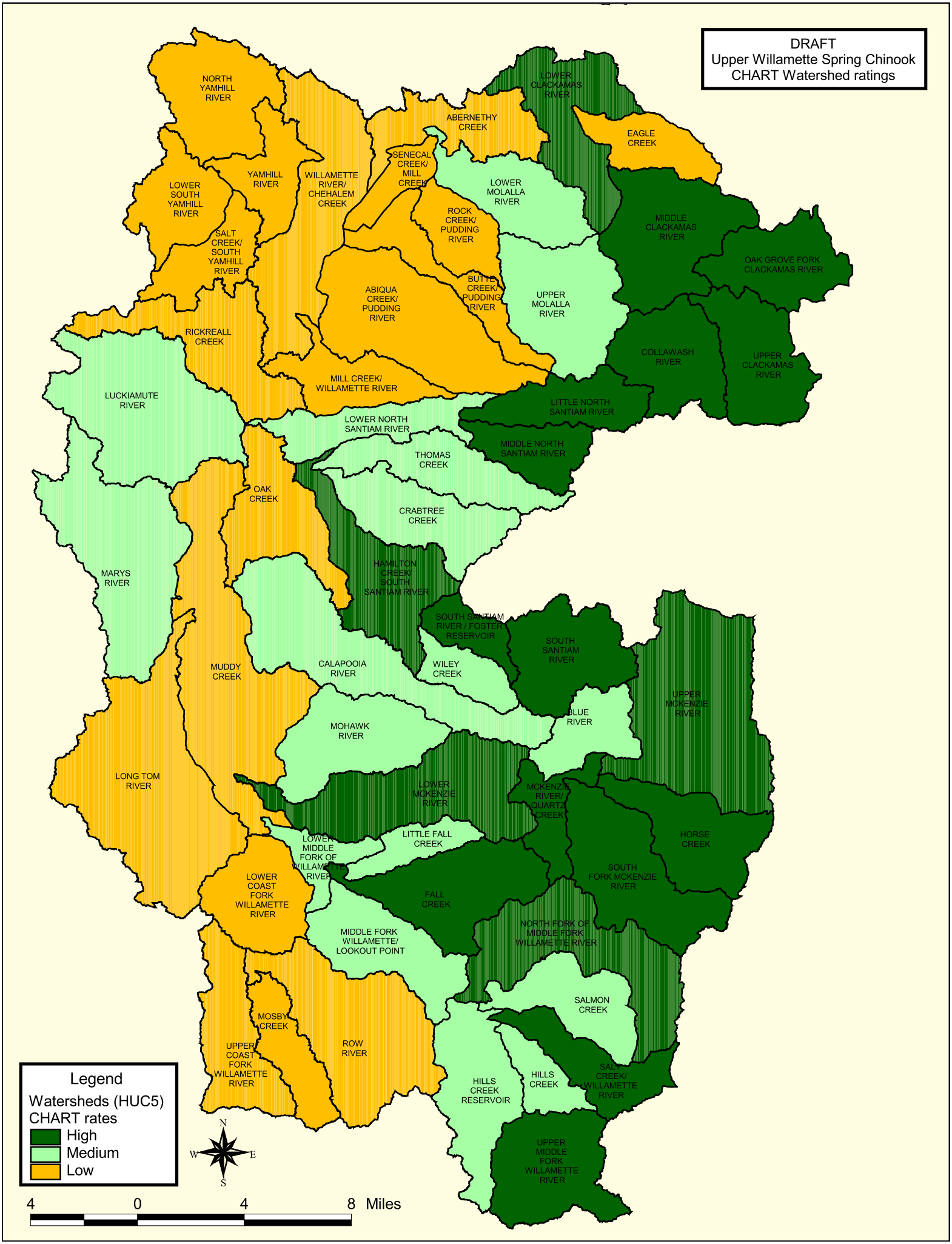
Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C9	Molalla/Pudding	Butte Creek/Pudding River	1709000902	7	Low-moderate HUC5 score; PCEs support a TRT demographically independent population but subbasin has relatively low abundance and distribution objectives identified by ODFW; PCE quality relatively low	Low
C9	Molalla/Pudding	Rock Creek/Pudding River	1709000903	7	Low-moderate HUC5 score; PCEs support a TRT demographically independent population but subbasin has relatively low abundance and distribution objectives identified by ODFW; PCE quality relatively low	Low
C9	Molalla/Pudding	Senecal Creek/Mill Creek	1709000904	7	Low-moderate HUC5 score; PCEs support a TRT demographically independent population but subbasin has relatively low abundance and distribution objectives identified by ODFW; PCE quality relatively low	Low
C9	Molalla/Pudding	Upper Molalla River	1709000905	8	Moderate HUC5 score; PCEs support a TRT demographically independent population but subbasin has relatively low abundance and distribution objectives identified by ODFW; most of spawning PCEs for this population probably in this HUC5 although of relatively low quality	Medium
C9	Molalla/Pudding	Lower Molalla River	1709000906	8	Moderate HUC5 score; PCEs support a TRT demographically independent population but subbasin has relatively low abundance and distribution objectives identified by ODFW; PCE quality relatively low yet important connectivity reaches for the upstream HUC5	Medium

Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C10	Clackamas	Collawash River	1709001101	12	High HUC5 score; PCEs support a TRT core population and the only population downstream of Willamette Falls; ODFW considers Clackamas as essential habitat for spring chinook; PCEs are in a FEMAT key watershed and HUC5 is one of few remaining high elevation/gradient areas for ESU	High
C10	Clackamas	Upper Clackamas River	1709001102	12	High HUC5 score; PCEs support a TRT core population and the only population downstream of Willamette Falls; ODFW considers Clackamas as essential habitat for spring chinook; PCEs are in a FEMAT key watershed and HUC5 is one of few remaining high elevation/gradient areas for ESU	High
C10	Clackamas	Oak Grove Fork Clackamas River	1709001103	11	High HUC5 score; PCEs support a TRT core population and the only population downstream of Willamette Falls; ODFW considers Clackamas as essential habitat for spring chinook; PCEs are in a FEMAT key watershed; PCEs very limited here but HUC5 is one of few remaining high elevation/gradient areas for ESU	High
C10	Clackamas	Middle Clackamas River	1709001104	12	High HUC5 score; PCEs support a TRT core population and the only population downstream of Willamette Falls; ODFW considers Clackamas as essential habitat for spring chinook; PCEs are in a FEMAT key watershed	High

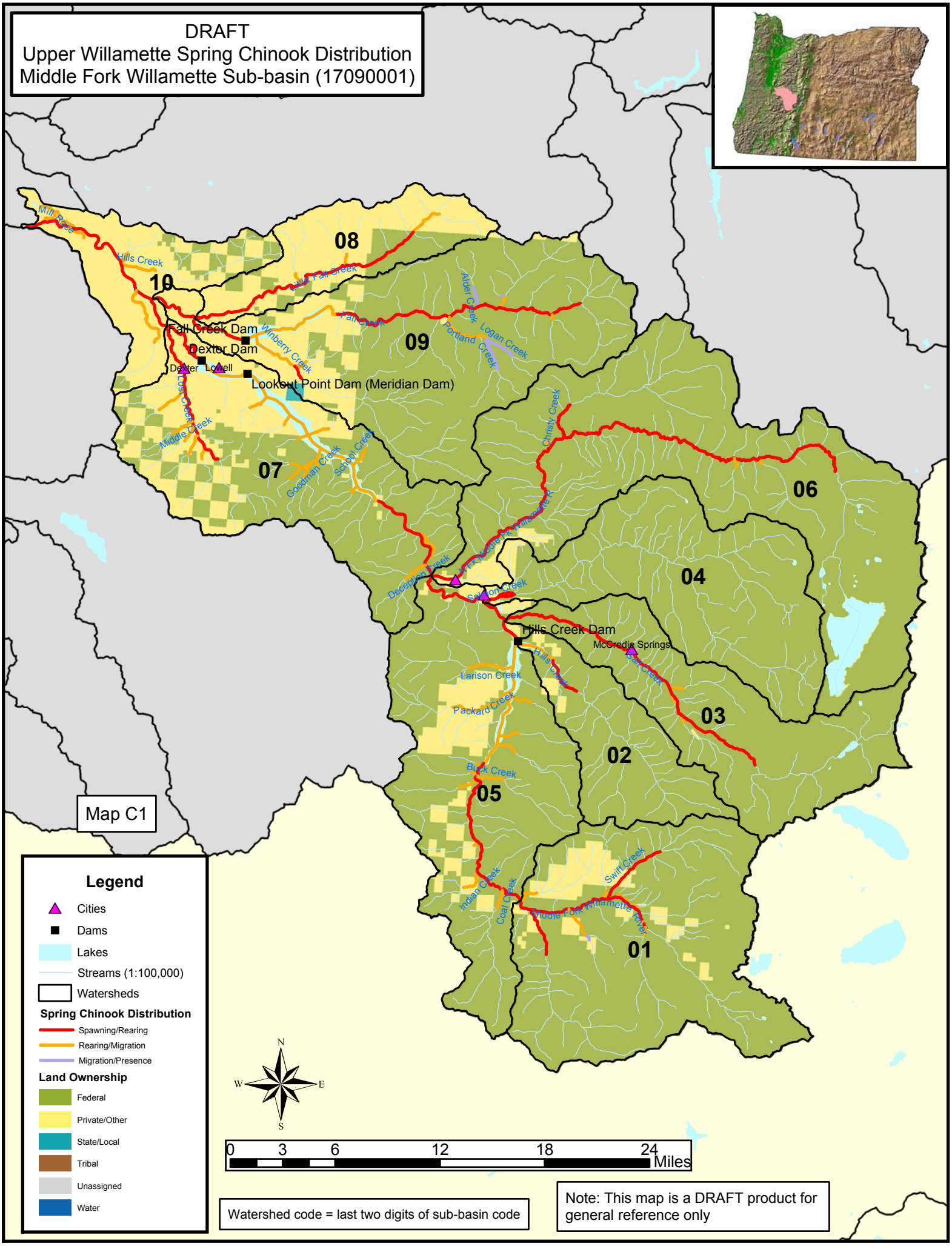
Map Code	Subbasin	Watershed/ Corridor	HUC5 Code	Total HUC5 Score (0-18)[7]	Comments/Other Considerations	Initial CHART Rating of Conservation Value
C10	Clackamas	Eagle Creek	1709001105	5	Low HUC5 score; PCEs support a TRT core population and the only population downstream of Willamette Falls; ODFW considers Clackamas as essential habitat for spring chinook, but CHART noted very limited production in this HUC5	Low
C10	Clackamas	Lower Clackamas River	1709001106	11	High HUC5 score; PCEs support a TRT core population and the only population downstream of Willamette Falls; ODFW considers Clackamas as essential habitat for spring chinook; PCEs in HUC5 likely lowest quality in subbasin but HUC5 has high value connectivity reaches for upstream HUC5s	High
	Multiple	Lower Willamette/Columbia River corridor	NA	NA	Area not scored since many reaches are outside HUC5 boundaries. However, the CHART concluded that rearing and migration PCEs throughout this corridor are highly essential to ESU conservation	High

* Scored by CHART although HUC5 is currently blocked and occupied (via trap and haul) only by non-listed hatchery chinook salmon.

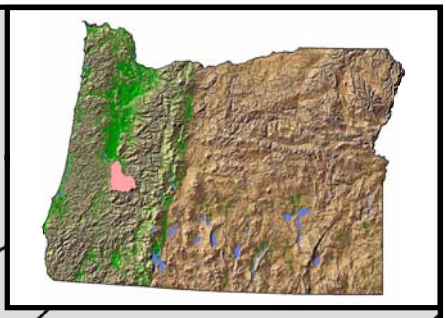
Figure C1. Initial CHART Ratings of Conservation Value for Habitat Areas in HUC5 Watersheds Occupied by the Upper Willamette River Chinook Salmon ESU


DRAFT
Upper Willamette Spring Chinook
CHART Watershed ratings
NORTH YAMHILL RIVER
LOWER CLACKAMAS RIVER
ABERNETHY CREEK
EAGLE CREEK
SENECAL CREEK/ MILL CREEK
YAMHILL RIVER
WILLAMETTE RIVER/ CHEHALEM CREEK
LOWER SOUTH YAMHILL RIVER
LOWER MOLALLA RIVER
ROCK CREEK/ PUDDING RIVER
MIDDLE CLACKAMAS RIVER
SALT CREEK/ SOUTH YAMHILL RIVER
OAK GROVE FORK CLACKAMAS RIVER
BUTTE CREEK/ PUDDING RIVER
ABIQUA CREEK/ PUDDING RIVER
UPPER MOLALLA RIVER
RICKREALL CREEK
COLLAWASH RIVER
UPPER CLACKAMAS RIVER
MILL CREEK/ WILLAMETTE RIVER
LUCKIAMUTE RIVER
LITTLE NORTH SANTIAM RIVER
LOWER NORTH SANTIAM RIVER
MIDDLE NORTH SANTIAM RIVER
THOMAS CREEK
OAK CREEK
CRABTREE CREEK
MARYS RIVER
HAMILTON CREEK/ SOUTH SANTIAM RIVER
SOUTH SANTIAM RIVER / FOSTER RESERVOIR
SOUTH SANTIAM RIVER
MUDDY CREEK
CALAPOOIA RIVER
WILEY CREEK
UPPER MCKENZIE RIVER
BLUE RIVER
MOHAWK RIVER
LONG TOM RIVER
LOWER MCKENZIE RIVER
MCKENZIE RIVER/ QUARTZ CREEK
HORSE CREEK
LOWER MIDDLE FORK OF WILLAMETTE RIVER
LITTLE FALL CREEK
SOUTH FORK MCKENZIE RIVER
LOWER COAST FORK WILLAMETTE RIVER
FALL CREEK
NORTH FORK OF MIDDLE FORK WILLAMETTE RIVER
MIDDLE FORK WILLAMETTE/ LOOKOUT POINT
SALMON CREEK
MOSBY CREEK
ROW RIVER
UPPER COAST FORK WILLAMETTE RIVER
HILLS CREEK RESERVOIR
HILLS CREEK
SALT CREEK/ WILLAMETTE RIVER
UPPER MIDDLE FORK WILLAMETTE RIVER
Legend
Watersheds (HUC5)
CHART rates
High
Medium
Low
N
W
E
S
4 0 4 8 Miles

Maps C1 through C10. Upper Willamette River Chinook Salmon ESU – Habitat Areas Under Consideration for Critical Habitat Designation (note: the Lower Willamette/Columbia River corridor is not shown but is under consideration as described in the text)


DRAFT
Upper Willamette Spring Chinook Distribution
Middle Fork Willamette Sub-basin (17090001)
Map C1
Legend
Cities
Dams
Lakes
Streams (1:100,000)
Watersheds
Spring Chinook Distribution
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
08
10
09
07
06
04
03
02
05
01
Fall Creek Dam
Dexter Dam
Dexter
Lowell
Lookout Point Dam (Meridian Dam)
Hills Creek Dam
McCredie Springs
Mill Creek
Hills Creek
Little Fall Creek
Fall Creek
Alder Creek
Logan Creek
Portland Creek
Winberry Creek
Lost Creek
Middle Creek
Goodman Creek
School Creek
Christy Creek
Deception Creek
Salmon Creek
Larison Creek
Packard Creek
Black Creek
Indian Creek
Coal Creek
Swift Creek
Middle Fork Willamette River
N
S
E
W
0 3 6 12 18 24
Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference only

DRAFT
Upper Willamette Spring Chinook Distribution
Coast Fork Willamette Sub-basin (17090002)



Map C2

Legend

- Cities
- Dams
- Streams (1:100,000)
- Watersheds
- Lakes

Spring Chinook Distribution

- Spawning/Rearing
- Rearing/Migration
- Migration/Presence

Land Ownership

- Federal
- Private/Other
- State/Local
- Tribal
- Unassigned
- Water

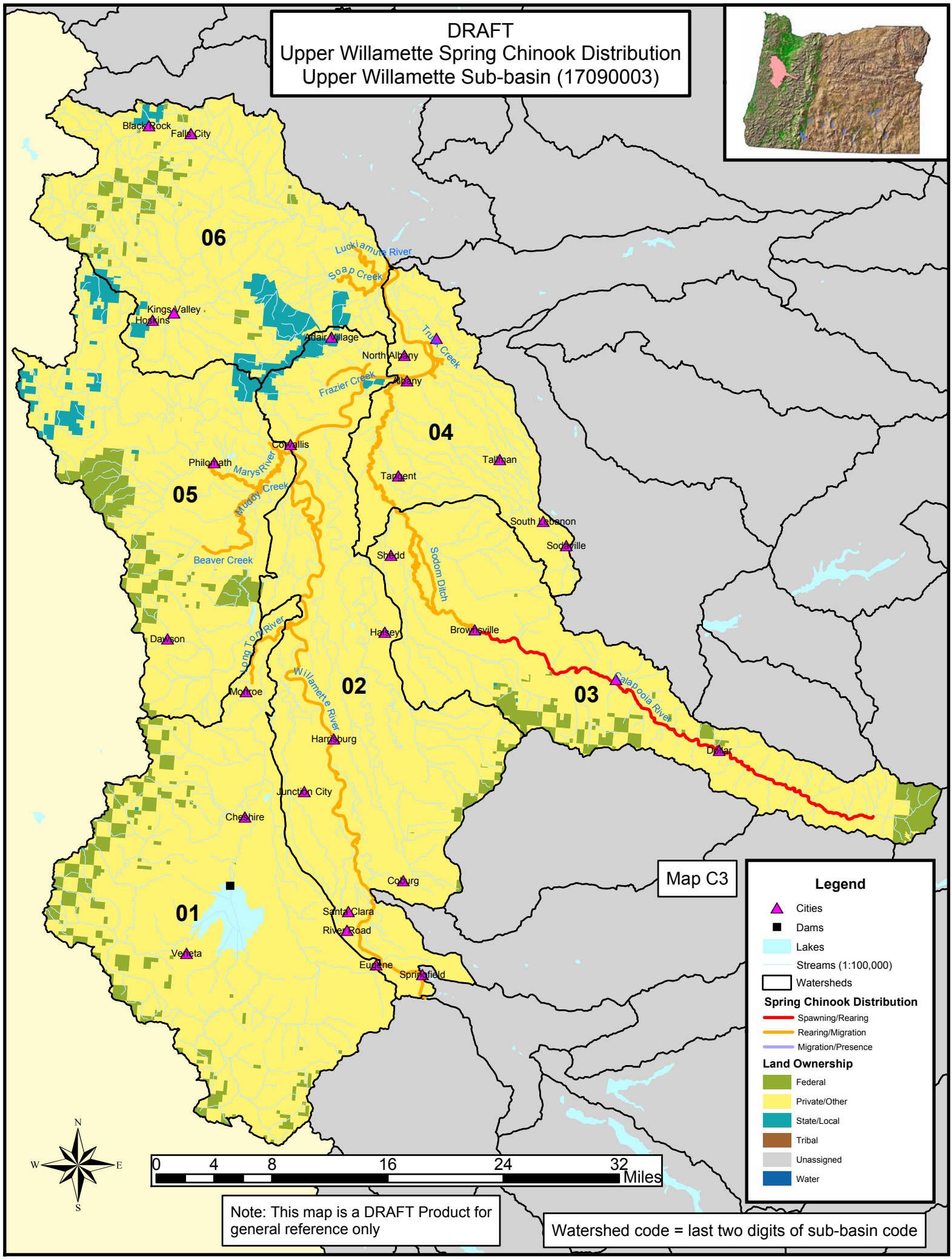
N
W
E
S

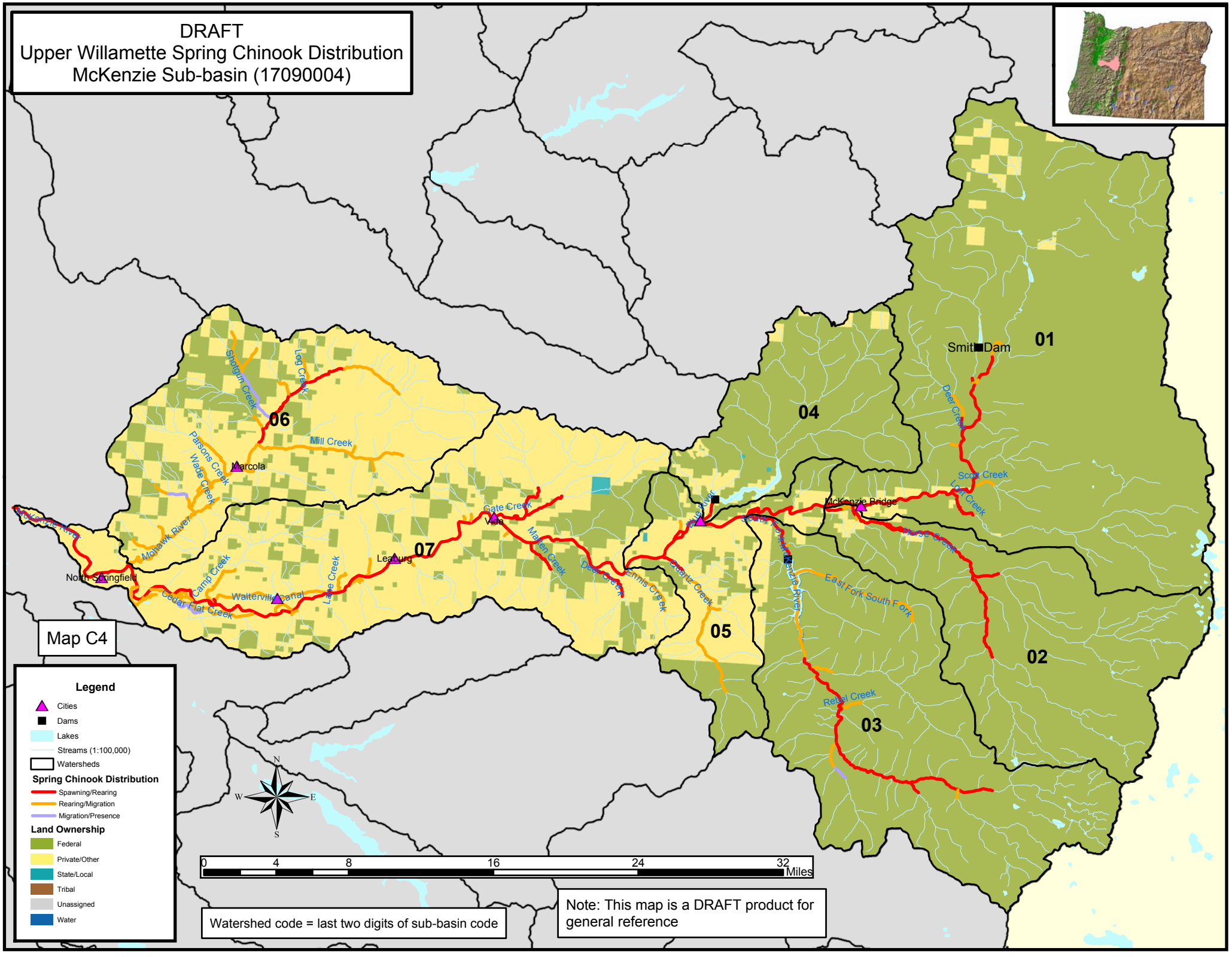
0 1.5 3 6 9 12 Miles

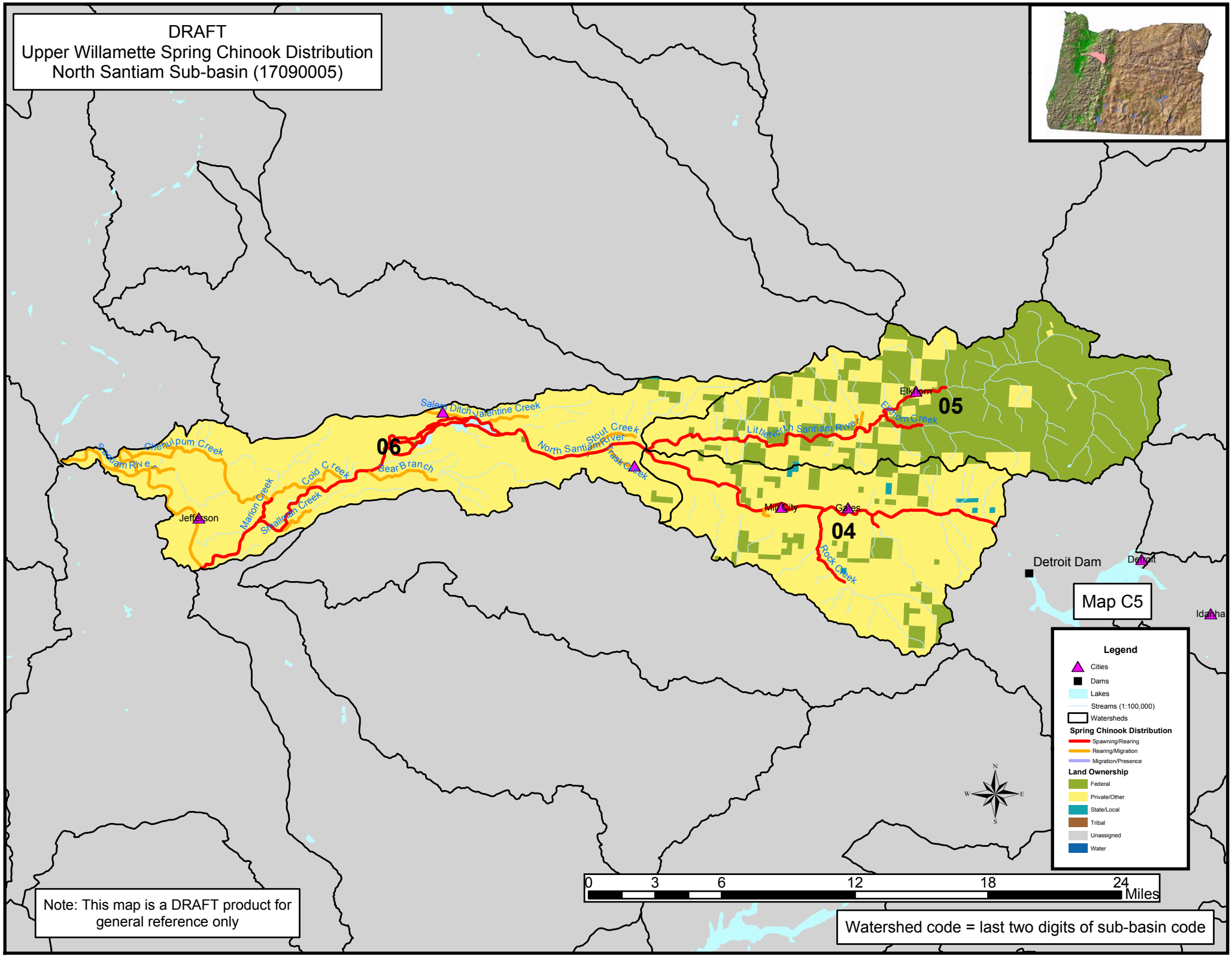
Watershed code = last two digits of sub-basin code

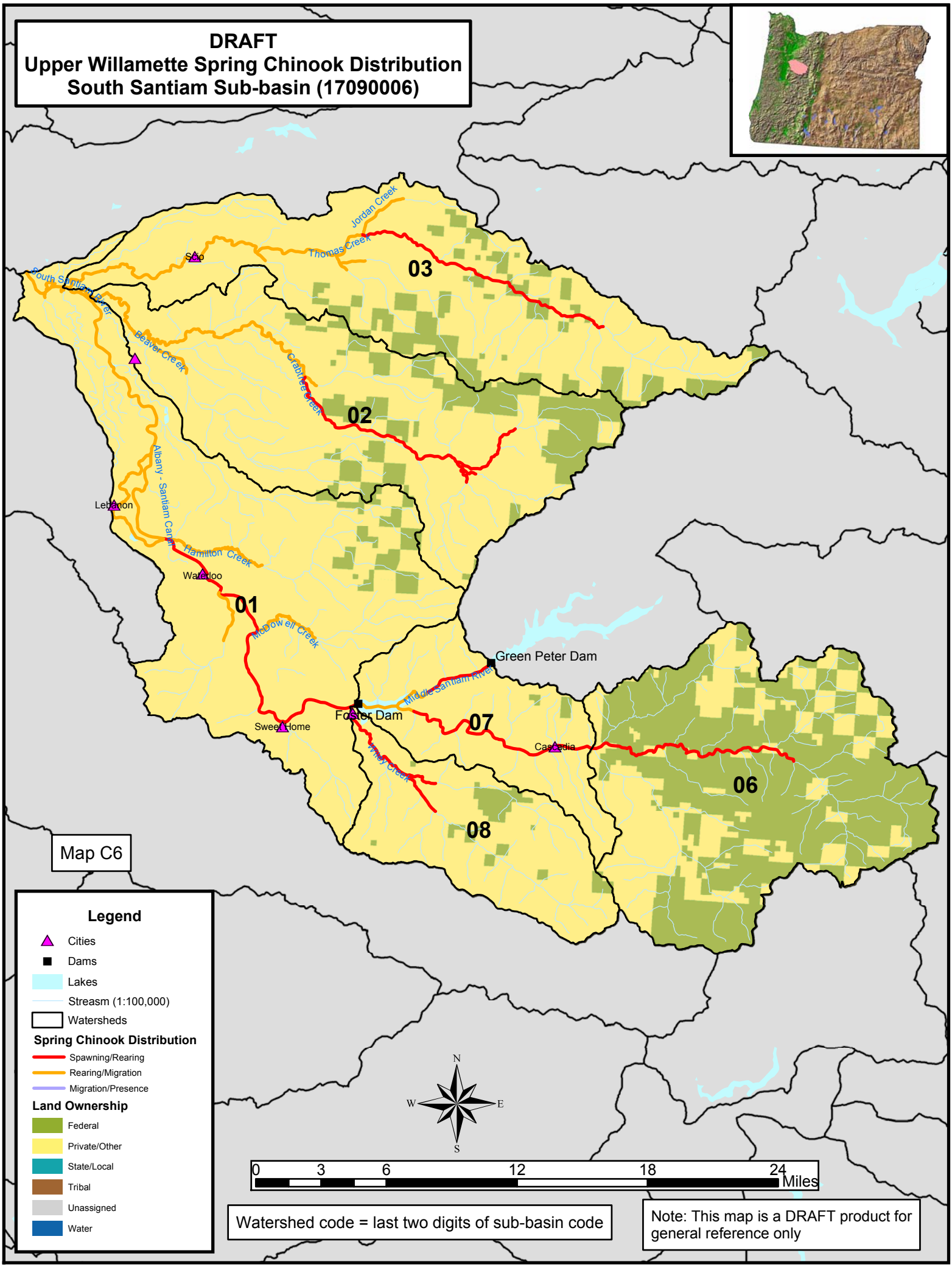
Goshen
05
Coast Fork Willamette River
Row River
Dorena Dam
Dorena
Culp Creek
Disston
01
03
Mosby Creek
02

Note: This map is DRAFT product for general reference only

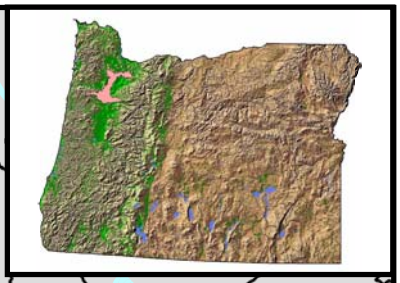

DRAFT
Upper Willamette Spring Chinook Distribution
Upper Willamette Sub-basin (17090003)
06
05
04
03
02
01
Black Rock
Falls City
Kings Valley
Hoskins
Adair Village
North Albany
Albany
Corvallis
Philomath
Tangent
Talman
South Lebanon
Sodaville
Shedd
Harrisburg
Halsey
Brownsville
Dallar
Junction City
Cheshire
Coburg
Santa Clara
River Road
Eugene
Springfield
Veneta
Dawson
Monroe
Beaver Creek
Muddy Creek
Marys River
Long Tom River
Willamette River
Soap Creek
Luckiamute River
Frazier Creek
Truax Creek
Sodom Ditch
Calapooia River
Map C3
Legend
Cities
Dams
Lakes
Streams (1:100,000)
Watersheds
Spring Chinook Distribution
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
N
W
E
S
0 4 8 16 24 32
Miles
Note: This map is a DRAFT Product for general reference only
Watershed code = last two digits of sub-basin code


DRAFT
Upper Willamette Spring Chinook Distribution
McKenzie Sub-basin (17090004)
Map C4
Legend
Cities
Dams
Lakes
Streams (1:100,000)
Watersheds
Spring Chinook Distribution
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
01
02
03
04
05
06
07
Smith Dam
McKenzie Bridge
Marcola
Leaburg
Vida
North Springfield
Walterville Canal
Mill Creek
Log Creek
Shotgun Creek
Parsons Creek
Wade Creek
Mohawk River
Camp Creek
Cedar Flat Creek
Lane Creek
Gate Creek
Martin Creek
Deer Creek
Ennis Creek
Quartz Creek
Deer Creek
Scott Creek
Lost Creek
Horse Creek
East Fork South Fork
Retail Creek
N
S
E
W
0 4 8 16 24 32 Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference


DRAFT
Upper Willamette Spring Chinook Distribution
North Santiam Sub-basin (17090005)
06
05
04
Salem Ditch
Valentine Creek
Stout Creek
North Santiam River
Little North Santiam River
Elkhorn
Elkhorn Creek
Bear Branch
Cold Creek
Shellburn Creek
Marion Creek
Chenulpum Creek
Jefferson
Mill City
Gates
Rock Creek
Detroit Dam
Detroit
Idanha
Map C5
Legend
Cities
Dams
Lakes
Streams (1:100,000)
Watersheds
Spring Chinook Distribution
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
0 3 6 12 18 24
Miles
Note: This map is a DRAFT product for general reference only
Watershed code = last two digits of sub-basin code


DRAFT
Upper Willamette Spring Chinook Distribution
South Santiam Sub-basin (17090006)
Jordan Creek
Thomas Creek
Scio
South Santiam River
Beaver Creek
Crabtree Creek
03
02
Albany - Santiam Canal
Lebanon
Hamilton Creek
Waterloo
01
Mobowell Creek
Green Peter Dam
Middle Santiam River
Foster Dam
Sweet Home
07
Cascadia
Wiley Creek
06
08
Map C6
Legend
Cities
Dams
Lakes
Streasm (1:100,000)
Watersheds
Spring Chinook Distribution
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
N
W
E
S
0 3 6 12 18 24
Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference only

DRAFT
Upper Willamette Spring Chinook Distribution
Middle Willamette Sub-basin (17090007)



Map C7

Legend

- Cities
- Dams
- Lakes
- Streams (1:100,000)
- Watersheds

Spring Chinook Distribution

- Spawning/Rearing
- Rearing/Migration
- Migration/Presence

Land Ownership

- Federal
- Private/Other
- State/Local
- Tribal
- Unassigned
- Water

N
W E
S

0 4.5 9 18 27 36 Miles

Watershed code = last two digits of sub-basin code

Note: This map is a DRAFT product for general reference only

DRAFT
Upper Willamette Spring Chinook Distribution
Yamhill Sub-basin (17090008)

06

07

04

05

Yamhill

Carlton

Lafayette

McMinnville

Dayton

Amity

Sheridan

Willamina

Perrydale

Millican Creek

North Yamhill River

Hawn Creek

South Yamhill River

Yamhill River

Palmer Creek

Stag Creek

Map C8

Legend

- Cities
- Dams
- Lakes
- Streams (1:100,000)
- Watersheds

Spring Chinook Distribution

- Spawning/Rearing
- Rearing/Migration
- Migration/Presence

Land Ownership

- Federal
- Private/Other
- State/Local
- Tribal
- Unassigned
- Water

N

W

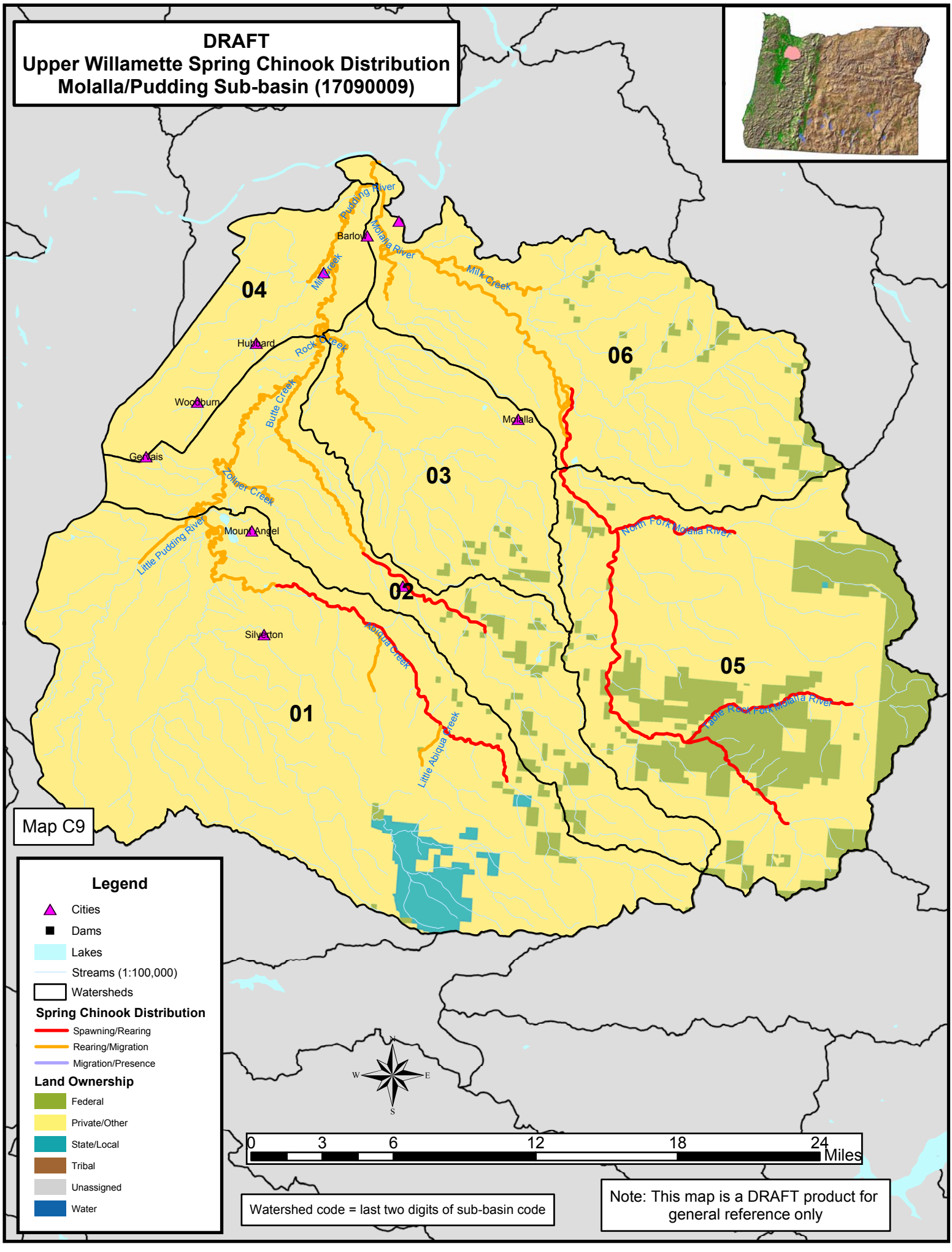
E

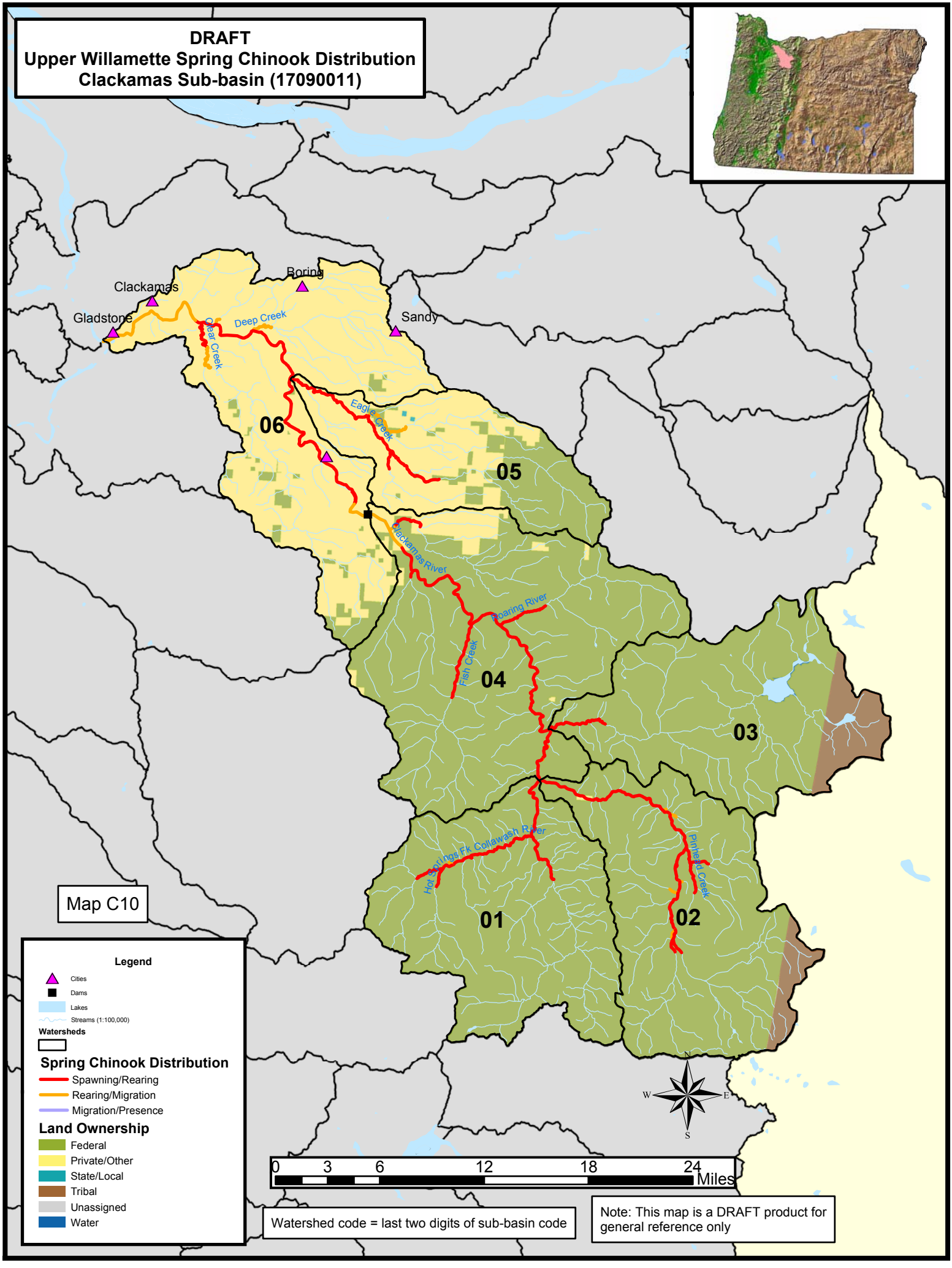
S

0 2 4 8 12 16 Miles

Note: This map is a DRAFT product for general reference only

Watershed code = last two digits of sub-basin code


DRAFT
Upper Willamette Spring Chinook Distribution
Molalla/Pudding Sub-basin (17090009)
Pudding River
Molalla River
Barlow
Milk Creek
Milk Creek
04
Hubbard
Rock Creek
Butte Creek
06
Woodburn
Molalla
Gervais
03
Zollner Creek
North Fork Molalla River
Little Pudding River
Mount Angel
02
Silverton
Abiqua Creek
05
Table Rock Fork Molalla River
Little Abiqua Creek
01
Map C9
Legend
Cities
Dams
Lakes
Streams (1:100,000)
Watersheds
Spring Chinook Distribution
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
N
W
E
S
0 3 6 12 18 24
Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference only


DRAFT
Upper Willamette Spring Chinook Distribution
Clackamas Sub-basin (17090011)
Clackamas
Gladstone
Boring
Sandy
Deep Creek
Clear Creek
Eagle Creek
Clackamas River
Roaring River
Fish Creek
Hot Springs Fk Collawash River
Pinhead Creek
06
05
04
03
02
01
Map C10
Legend
Cities
Dams
Lakes
Streams (1:100,000)
Watersheds
Spring Chinook Distribution
Spawning/Rearing
Rearing/Migration
Migration/Presence
Land Ownership
Federal
Private/Other
State/Local
Tribal
Unassigned
Water
N
W
E
S
0 3 6 12 18 24
Miles
Watershed code = last two digits of sub-basin code
Note: This map is a DRAFT product for general reference only